Online Prediction Under Model Uncertainty via Dynamic Model Averaging

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We consider the problem of real-time prediction when it is uncertain what the best prediction model is. We develop a method called Dynamic Model Averaging (DMA) in which a state space model for the parameters of each model is combined with a Markov chain model for the correct model, allowing the correct model to vary over time. The state space and Markov chain models are both specified parsimoniously in terms of forgetting. The method is applied to predicting the output of a cold rolling mill, where the output is measured with a time delay. When only a small number of physically-based models were considered and one was clearly best, the method quickly converged to the best model, and the cost of model uncertainty was small. When model uncertainty and the number of models considered were large, our method ensured that the penalty for model uncertainty was small. This is joint work with Miroslav Karny, Josek Andrysek and Pavel Ettler.